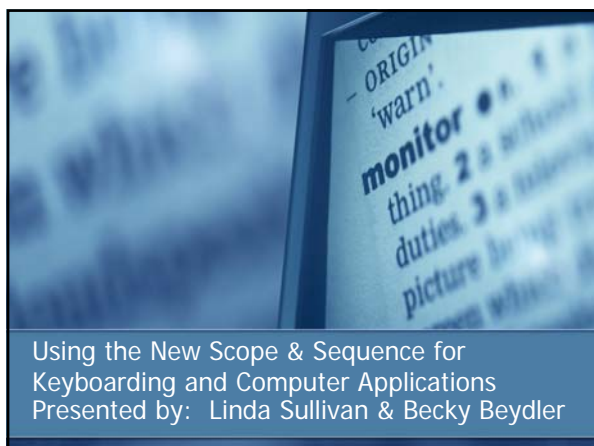# Using the New Scope & Sequence for Keyboarding & Computer Applications

Presented by:

Linda Sullivan & Becky Beydler

Missouri ACTE

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Using the New Scope & Sequence for Keyboarding and Computer Applications
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What is the Scope and Sequence?

- Competencies for basic keyboarding, computer operations, and computer applications
- Suggestions of what to teach when
- A model districts can adapt
- Grade levels matching ISTE NETS categories
- Mastery levels: Aware, Introduce, Reinforce, Master

How is the Scope and Sequence organized?

- Six NETS categories
  - 1. Basic Operations and Concepts
  - 2. Social, Ethical, and Human Issues
  - 3. Technology Productivity Tools
  - 4. Technology Communications Tools
  - 5. Technology Research Tools
  - 6. Technology Problem-Solving and Decision-Making Tools

How was the Scope and Sequence developed?

- Advisory committee
- Review of existing scope and sequences
- Incorporation of ISTE National Educational Technology Standards
- Consultation with a national keyboarding consultant
- Three days of meetings
- Many hours of review and revision
- DESE funding and MCCE coordination

What is keyboarding?

- A computer literacy tool
- A communication tool
- A productivity tool

What is keyboarding?

- The process of putting information into various types of equipment using a typewriter-like keyboard.
  --Policies Commission for Business and Economic Education Statement #35

Keyboarding is a Cumulative Skill.

Why should keyboarding be taught?

- Children use computers before they enter school
- Computers are used for writing as early as K-1
- More technology is moving to lower grades.
- Proper keying skills prevent bad habits
- Technology permeates all areas of our lives

Why should keyboarding be taught?

- Skill valued by parents
- Essential skill for all students and workers
- Keying skill enables students to
  - compose faster
  - be prouder of their work
  - produce neater documents
  - be more motivated
  - demonstrate better language arts skills

Why should keyboarding be taught?

- To help students meet the NETS 8th-grade technology standard – based on NETS

8th-Grade Technology Standard

- Apply strategies for identifying and solving hardware/software problems
- Exhibit legal and ethical behaviors when using information & technology
- Use content-specific tools, software, & simulations to support learning and research

8th-Grade Technology Standard

- Design, develop, publish, and present products using technology resources that demonstrate and communicate curriculum concepts
- Select and use appropriate tools and technology resources to accomplish tasks and solve problems

When should keyboarding be taught?

- Prior to word processing
- No earlier than 3-4 grade for touch keying
- Minimum of 20-30 hours to get students to a speed faster than they write
- Reinforcement and refinement through use across the curriculum

Who should teach keyboarding?

A teacher – not software!

- Team business and elementary teachers or media specialists
- Provide in-district training to elementary and other non-business teachers

What is the role of the teacher?

- Teach proper technique for successful and safe keyboarding
- Teach keyboarding by touch at the appropriate age
- Inform students and parents about repetitive stress injuries

What is the role of the teacher?

- Emphasize ways to minimize risks of RSIs
- Promote the lifelong value of keyboarding to colleagues and administrators
- Advocate for the following:
  - Appropriate scheduled time – minimum 20 lessons of 20-30 minutes per day
  - Funds for equipment and furniture
  - Recognition of students' achivements

How to implement within a District?

- Business teachers' lead
- District technology plan review
- Administration's support to meet the required technology standard by 8th grade
- Support to maintaining technology skill into college or the workplace
- Meetings with teachers to determine what is taught when and by whom
- District-wide training to get cooperation from all faculty to encourage proper computer use

Examples of successful programs?

- Ozark
  - K-4 Students – 50-60 minutes per week
  - 5-6 Students – 50 minutes per week
  - Software used
    - Bernie (1-2)
    - Type to Learn (3-4)
    - Mavis (5-6)
  - Contact:
    Michelle Lindsey, Technology Instructor
    Ozark Upper Elementary School
    PO Box 166, Ozark, MO 65721
    417.582.4830, michellelindsey@mail.ozark.k12.mo.us
  - http://www.ozark.k12.mo.us/upper/index.htm

Examples of successful programs?

- Columbia
  - David Heath – Thursday Roundtable
  - Software used
    - Bernie
    - Vendor provided training
  - 3rd Grade – 36 hours, no more than 30-minute blocks
  - 4th Grade – 18 hours (30 min. block/week); reinforce skills through writing
  - 5th Grade – 18 hours (30 min. block/week); reinforce skills, emphasize format through writing

Examples of successful programs?

- Lee's Summit
  - 3-4 Students – 15 consecutive day unit
  - 5-6 Students – Classroom teacher taught unit
  - http://its.leesummit.k12.mo.us/keyboarding.htm

Questions?

WHAT RESEARCH AND RELATED LITERATURE SAYS ABOUT KEYBOARDING INSTRUCTION

1. Without keyboarding instruction, upper elementary students will write at the keyboard at half the rate (5 wpm) they write with pencil (10 wpm). (Wetzel, 1985) The average typing rate of untrained third to sixth graders is 4.5 wpm. (Stoecker, 1985) The goal for elementary keyboarding is a rate that is faster than average handwriting speed (7-10 wpm for grades 4-6). (Wetzel, 1985; Cameron, 1986)

2. Keyboarding is an essential and enabling skill for all students and all workers. Keyboarding, no longer a skill reserved for secretaries, must be formally taught to and learned by all students. (Toppe, 1991) Business professionals who have keyboarding skills believe these skills make them more productive. (Wiggs, 1993)

3. The purpose of keyboarding instruction at the elementary level is to familiarize students with keyboard layout and provide at least a minimal level of proficiency in touch typing. (Balajthy, 1988) The goal is to prepare students for information retrieval and word processing. (Nieman, 1996)

4. Keyboarding instruction should include a language-based approach that assumes that students are developing language skills and that keyboarding will be used in the context of language arts skills development. Such an approach assumes that keyboarding is a means to an end and therefore should be introduced as students begin word processing and other communicative computer activities. (Communikeys, MECC, 1989)

5. Keyboarding instruction is not appropriate for grades K-2 because of small hand size, weaker hand-eye coordination and shorter attention span. (Kaser, 1984; Storey, 1985, Wetzel, 1985; Cameron, 1986; Behymer & Echternacht, 1987) Children in grades four to six gradually exhibit greater smoothness and command of small-muscle expression, which is reflected in better coordination in activities. (Prigge and Braathen, 1993) Students below the third grade, typically, do not possess the dexterity and hand size to manipulate the keys effectively. The suggested age for effective keyboard instruction is 10 to 12 years of age. (Elementary/Middle School Keyboarding Strategies Guide, 1992)

6. A child can learn to key by touch if his/her maturity level is at least that of an average third grader. The level of an individual's concentration appears to be the only limiting factor. (USNY/NYSED, 1986)

7. Students younger than 11 years old do not possess the hand-eye coordination or fine motor control necessary for the development of typing skills. It is, therefore, recommended that initial keyboarding classes not begin before the fifth grade (Andelora, 1994).

8. Insufficient time allotted to keyboarding instruction will lead to failure to achieve automaticity. For touch typing to be useful, the process must become automatic and students must reach a speed at least equivalent to their handwriting speed.. If time allotted to keyboarding instruction and follow-up is minimal, skills learned will rapidly disappear after instruction ends. (Balajthy, 1988)

9. Third, fourth and fifth graders will need 20-30 hours of instruction if they are to type as quickly as they can write by pencil. However, these students will regress in their touch typing skills if they do not utilize their touch typing at intervals throughout the year. (Wetzel, 1985)

10. In approximately 25 hours of keyboarding instruction, students can develop a usable keyboarding skill (two to three times their average handwriting speeds) that can then be used as an aid to other learnings, such as the improvement of writing skills. (Erickson, 1985, 1986)

11. Research shows that children with keying skills are able to compose faster, are prouder of their work, produce documents with a neater appearance, have better motivation, and demonstrate improved language arts skills (Nieman, 1996).

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12. If correct techniques are taught with initial computer use and progressively added each year, the level of keyboarding ability is continually strengthened. (Davidson and Kochmann, 1996)

13. Develop maximum response speed in keyboard stroking and manipulation through:
    * Pacing techniques for forcing rate of response and for developing response chaining.
    * Massing and distributing practice for maximum gain effect.
    * Establishing individual, intermediate response rate goals.
    * Selecting appropriate copy.

14. Develop response accuracy in keyboard stroking and manipulation through:
    * Response (stroke) differentiation.
    * Speed response to copy difficulty.
    * Focusing concentration on a specific technique.

15. Enter numeric data from top row and keypad.

16. Integrate and sequence technique, speed and accuracy goals.

17. Schedule keyboard technique, speed and accuracy reinforcement activities after achieving intensive initial stroking goals.

18. Integrate keyboarding with other academic activities to reinforce keyboarding skills. 19. Measure and evaluate keyboarding skills.

19. The best programs involve a partnership between elementary education and business education instructors working together to plan for the delivery of instruction. (Erthal, 1998)

20. Hoggatt (1998) has cited the following information taken from the 1993 U.S. Census on workers 18 years of age and older. Word processing applications were used by 44.4 percent of these workers on the job. In addition, 36.1 percent used spreadsheets, and 34.5 percent used database applications. For all of these skills to be employed effectively, superior inputting skills are essential. As Hoggatt (1998) has stated, "Keyboarding is a basic literacy skill."

21. Limit intensive practice to 15 minutes. Practicing longer than 15 minutes at a time produces diminishing returns. Students get bored, lose their concentration, start falling into bad habits and are at a higher risk for injury. Stretch, shake and rest! Students should rest their hands, using proper stretching, shaking and relaxation techniques at the end of each section of typing, every minute or so. (Karl Barksdale, 2003)

22. Eliminate all timings longer than 3 minutes and use 3-minute timings sparingly. (Karl Barksdale, 2003)

23. Teaching proper keying/sitting position, curved fingers and floating techniques. While ergonomically correct techniques alone will not prevent injuries from happening, they can minimize the impact of typing and clicking on the human body. See explanations of each at www.speakingsolutions.com/news. (Karl Barksdale, 2003)
    * Teach neutral wrist and arm position
    * Demand proper sitting position and keyboard height
    * Provide each student with an adjustable chair
    * Tell students to use a light touch
    * Emphasize curved fingers
    * Allow hands to float to the upper and lower reaches
    * Never let students rest their hands on the keyboard or the table

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KEYBOARDING TECHNIQUE EVALUATION

Student Name_____

Rating Scale:

On Target—All technique is performed correctly
Acceptable—Needs some minor adjustments in technique
Not Acceptable—Needs major improvement in technique

	On Target	Acceptable	Not Acceptable
Position at the Machine			
Keystroking			
Touch Keyboarding			
Use of Operational Keys			

Position at the Machine
    Back straight
    Arms steady, almost motionless, parallel to keyboard
    Elbows relaxed, close to body

Keystroking
    Curved fingers
    Quick, snap stroke
    Wrists low and relaxed, NOT resting on keyboard, desk or computer (Carpal Tunnel
        Syndrome is caused by resting hands on keyboard and poor posture!)
    Use of correct fingering

Touch Keyboarding
    Eyes on copy or screen

Operational Keys
    Operates return/enter key without looking
    Operates space bar with a quick, down-and-in motion
    Operates shift key in three-step pattern: shift-strike-release
    Operates tab key without looking
    Operates backspace/delete key without looking

SOFTWARE PACKAGES

Several software packages that teach and refine keyboarding skills are currently on the market. The software listed below is housed at the Nebraska Department of Education Technology Center. You may preview any of these software packages at the Technology Center, which is located at 301 Centennial Mall South, Lincoln, NE. You may call the Technology Center at (402) 471-4113 to inquire about any of these packages.

Keyboarding Awareness Applications (K-3)

Type to Learn Jr., Sunburst Software. This new program is similar to Type to Learn but focuses on K-2 grades. The appealing content reinforces rhyming and spelling skills. Students discover the letter, number, and simple punctuation keys through a fun, age-appropriate introduction to the keyboard. Contact (800) 321-7511 or search by title at www.sunburst.com.

Type to Learn Jr. New Keys for Kids, Sunburst Software. This new program is a follow-up program to Type to Learn Jr. and is designed for K-3 grades. Three fun practice and activity areas help students learn and type the home row keys, numbers, short sentences with punctuation, web site addresses and email addresses. Teachers can customize the program by creating and reviewing class lists, selecting practice modes, preselecting student practice time and activity sets and printing student reports. Contact (800) 321-7511 or search by title at www.sunburst.com.

Type to Learn: Assessment, Sunburst Software. Evaluate your students' keyboarding progress. Can be used independently or in conjunction with Type to Learn. Contains 22 tests with students having the choice of three testing styles and five different content themes. Teachers can set individual and group performance goals. Contact (800) 321-7511 or www.sunburston.com.

Typin's Cool *(formerly Almena Keyboard Training Systems).* This training system works at the elementary level, secondary level, and for staff training. It is an easy system for teaching people from grade 2 on up how to touch type. For more information about this system, contact Almena Keyboard Training System, Suite 203-251 Laurier Ave. West, Ottawa, Ontario, Canada K1P 5J6, (800) 267-AKTS (2587) or fax: (800) 238-1325.

Elementary Keyboarding Touch Typing Applications (4-6)

All the Right Type Three, Ingenuity Works, Inc. NEW VERSION available for Windows (Pentium 166 MHz processor or better) and Macintosh (OS 8.5 or later). Upgrade for $297.50. Home version available for $15. The teacher management is in the Maintenance Building and allows teacher to customize for each student, view their progress, and create new drills and tests. Numeric keypad was added. Software is Windows NT and client compatible with full network capacity. For further information, call (800) 665-0667 or visit www.ingenuityworks.com. With site licenses, teachers are entitled to toll-free technical support, (800) 665-0668, Ext. 1313.

Bernie's Typing Travels, Thomson South-Western. Available for Windows/Macintosh. This software replaces Paws in Typing Town and is a new-key learning keyboarding software program with skill building appropriate for students in grades 3 to 5. Features include numerous typing lessons, a graphics-packed word processor, printable certificates, editable spelling lists, a teacher tool, a progress chart that shows how well students are doing and an option for Spanish instructions. There is also a home-user version of the software. The Teacher's Resource Guide provides lesson plans, teaching strategies, tables of instruction, curriculum integration activities, blackline masters, keyboarding activities and a technique check sheet. A wide variety of preferences that can be controlled include allow or disallow game access, create custom spelling word lists, and control if the backspace key can be used. Call (800) 354-9706 for a demo CD or visit www.berniestypingtravels.com.

Keyboarding For Kids, Ellsworth Publishing. Available for Windows/Mac OSX. Teaches keyboarding correctly to young children through sixth grade. The content is phonetic by grade and reading level to facilitate learning reading along with learning keyboarding. Uses 15`-second to 1-minute timings. Includes complete Tutorial CD for teachers and can be shown to students the first day of keyboarding class. Textbook with software package is available as well as Internet-based K-12 license. Call 888.963.4817, email Sales@EllsworthPublishing.com or visit www.EllsworthPublishing.com. Online demo available.

Mavis Beacon Teaches Typing, Version 11, Learning Company. Each lesson addresses a particular typing problem with an appropriate remedy. Students may work in Mavis' classroom, create their own lesson plan or play games in the Arcade. The new CD-ROM version offers significant enhancements, which automatically adjust to user performance and preferences. Recommended for additional practice use at home as there are limited teacher utilities. Appropriate for grades 5 and up. For further information, call (800) 685-6322 or check out the web site at www.learningcompanyschool.com.

Type to Learn 3*,* Sunburst Software. Type to Learn teaches the keystrokes for the alphabet, numeral and punctuation keys by combining keyboard instruction with language arts education. Students explore compound words, antonyms, homophones, similes and other aspects of language through speed building drills and games, and composition. Scholastic Software Club sells the Type to Learn 3 Home Edition. The new version on CD-ROM provides many teacher control options. Contact (800) 321-7511 or www.sunburst.com

Middle Level Keyboarding Applications (Grade 6+)

MicroType 4.0, South-Western Thomson. This software includes alphabetic keyboarding, numeric keyboarding, keyboarding skill builder, numeric keypad, open screen, diagnostic writings, quick review, student performance records, and games. Spanish or English versions available. Call (800) 824-5179.

Typing Time, South-Western Thomson. Available for Windows/Macintosh. This software replaces Micro Type Multimedia or Version 3 and is designed for the middle school beginner using Casey as the theme character. Newkey learning is accompanied by detailed hand animation for correct finger placement. Teacher options are available for changing the preferences for the entire class, the backspace key, reports, etc. An optional textbook is correlated to the software for extra drills and keying activities. There is also a home-user version of the software. May be used in a stand-alone 6- to 9-week course or as a module incorporated into varying length courses. For further information contact South-Western Thomson, (800) 354-9706 or www.middleschool.swep.com.

UltraKey, Version 4.0, Bytes of Learning. The program analyzes complex errors and provides written diagnostic reports. Students are shown the correct fingering and key location when there is hesitation in striking a key. This software can be site licensed or is network compatible. Timed tests, color-coding, free typing, and a 10-key instructional pad are added options. Good posters for finger paths and technique. Appropriate for grades 7 and up. Contact (800) 465-6428 or www.bytesoflearning.com.

Additional Resources

Glencoe Computer Applications and Keyboarding, Glencoe Publishing. Middle school, junior high, and senior high keyboarding materials include a wide variety of texts, software and teacher resources combined to create the perfect introductory keyboarding and computer applications course. Contact (800) 541-0491.

Key Words, Humanities Software. Available for Apple, Macintosh, and Windows, this fun, language-based keyboarding package has strong teacher management options. Levels include elementary, middle, secondary, and special needs. Contact (800) 245-6737 for further details.

MicroPace Pro 2.0, South-Western Thomson. This software includes two skill-development programs (timed writing and paced writings) combined with drill practice. The diagnostic reports generated by the software identify areas that need improvement. Call (800) 824-5179 for further information.

Typing Tutor, Knowledge Adventure. Available on Mac or Windows, this package creates customized lessons based on individual needs. Practice samples are from over 100 well known books and entertaining lessons with 100 video clips. For further information: http://www.knowledgeadventure.com

Keyboarding Software Evaluation

Name of Software: _____

Suggestions for Using This Evaluation Instrument

► Use the ratings only as a guide in reviewing software.

► Give emphasis to those rating points which are of highest priority for your desired outcomes.

► Use the ratings to compare alternative software.

► Do not expect all high ratings for the software you adopt.

► Do not try to quantify these ratings—they obviously do not all have the same value.

► Answer the software questions, below, first. Then complete the software ratings that begin on the next page.

Software Questions

1. How much time does it take to complete a lesson?

2. How much time does it take to complete the entire software package?

3. Is the software a keyboarding game, or is it a program for psychomotor training?

4. What is the expected word-per-minute goal?

5. How often are timed writings included in the program?

6. How is the user made knowledgeable of the timed test results—immediately with visual prompt or on a separate screen?

7. Can a user intentionally or unintentionally skip exercises?

8. How are the goals set for timed writings—by the program, the instructor, or the user?

9. Can the student use the correction key?

10. What is the format of the practice material?

11. How many keys are introduced in each lesson?

12. Is a manual included with the software package?

13. Does the manual suggest weekly hours to be spent on the exercises?

14. Do you have the necessary hardware requirements to support this software, i.e., type of computer, memory capabilities, disk drive size, monitor and printer requirements?

Software Ratings

SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree

1. The software provides adequate instruction without undue verbal or written instructions by the teacher.	SA	A	U	D	SD
2. The touch method is reinforced.	SA	A	U	D	SD
3. The program is designed for individualized instruction.	SA	A	U	D	SD
4. Software includes effective activities to introduce numeric keys.	SA	A	U	D	SD
5. Software includes sufficient instructions for deciding margins and proper spacing.	SA	A	U	D	SD
6. Exercises are included to reinforce proofreading of keyed copy.	SA	A	U	D	SD
7. Sufficient operating instructions are given in the program or supporting documentation.	SA	A	U	D	SD
8. Software reinforces proper keyboarding posture.	SA	A	U	D	SD
9. Software reinforces correct fingering while keyboarding.	SA	A	U	D	SD
10. Software has easily understood exiting procedures.	SA	A	U	D	SD
11. The instructor can identify the progress of the student.	SA	A	U	D	SD
12. Previous lessons are reinforced.	SA	A	U	D	SD
13. Error messages are evident and easily understood.	SA	A	U	D	SD
14. Appropriate spacing rules are followed.	SA	A	U	D	SD
15. After introduction of new keys, there is reinforcement of correct finger placement.	SA	A	U	D	SD
16. When new keys are introduced, there is sufficient instruction for proper fingering.	SA	A	U	D	SD
17. Students can practice a lesson until a goal is met.	SA	A	U	D	SD
18. Software package has effective motivational tools.	SA	A	U	D	SD
19. Software has flexibility to alter the program for individual needs, i.e., alter speeds or defaults.	SA	A	U	D	SD
20. Use of correction key or keys is reinforced.	SA	A	U	D	SD
21. Errors are accounted for in student's work.	SA	A	U	D	SD
22. Directions in manual are easy to follow.	SA	A	U	D	SD
23. Practice exercises emphasize punctuation.	SA	A	U	D	SD
24. Cost of the software is reasonable.	SA	A	U	D	SD

CURRICULUM GUIDES

Nebraska Keyboarding Position Paper and Keyboarding Curriculum and Scope and Sequences Nebraska Keyboarding Teaching Strategies
http://www.nde.state.ne.us/BMIT - click on Curriculum - click on Elementary Keyboarding

Keyboarding Lessons and Ideas by Tonya Skinner
http://lessonplans.btskinner.com/

Middle School Online Resources
http://www.crews.org/curriculum/ex/compsci/keyboarding/index.htm

Game Aquarium
http://www.gamequarium.com/keyboarding.htm

Lee's Summit R7 Elementary Keyboarding Program
http://www.leesummit.k12.mo.us/its/keyboarding.htm

Virginia Business & Information Technology
http://www.doe.virginia.gov/VDOE/Instruction/CTE/be/

ADDITIONAL RESOURCES

How To Teach Keyboarding, Bytes of Learning, Inc. A comprehensive book, which sells for $19.95, is designed for teachers who may be teaching keyboarding for the first time. The text is complete with methodology, lesson plans, teaching tips and assessment strategies. Sitting Pretty: Safe Posture for Keyboarding and Other Activities, This lesson-plan book, which sells for $19.95, provides lesson plans for improving keyboarding techniques that will reduce Repetitive Strain Injuries. How To Teach Keyboarding, a 23-minute video, which sells for $29.95, is designed for teachers who may be teaching keyboarding for the first time. For more information on a113 resources, contact (800) 465-6428, www.bytesoflearning.com, email custservice www.bytesoflearning.com.

Keyboarding Methodology Instructional Guide for Teachers and Administrators, CTE Resource Center in Virginia. A comprehensive guide, which sells for $10, addresses program planning for delivering keyboarding as well as teaching strategies and activities. Call 804.673.3778 or visit http://CTEresource.org.

CTDNews: Workplace Solutions for Repetitive Stress Injuries offers 12 monthly issues for $173. A brochure can be ordered for $2 each entitled Prevention: Keyboarding Need Not Be Hazardous and Body Posture Affects Keyboard Position (Product #31023.1096). To order contact (800) 341-7874.

Keyboarding Wall Chart Poster. This 2 ft. x 3 ft. poster colorfully illustrates the QWERTY keyboard. Priced at $19.95, Item # KBWC, toll-free (888) 781-6921, www.bepublishing.com.

Games Keyboarding Teachers Play. Games, activities and instructional strategies that teaching and learning keyboarding fun. Priced at $35.95, Item #GKTP, ISBN 0-9721331-0-0, toll-free (888) 781-6921, www.bepublishing.com.

Elementary/Middle School Keyboarding Strategies Guide, 3rd edition, by Crews, North, and Erthal, published 2006 by National Business Education Association, ISBN 0-933964-65-X. Priced at $18 for members; $35 for non-members; www.nbea.org.

HARDWARE

AlphaSmart 3000 is a tool that lets students enter and edit text, then transfer it easily to a Macintosh or PC for formatting and printing. Volume discounts are available. For more information contact Alpha Smart, Inc., (888) 274-0680, Ext. 1006 or Arlene Steele at arlene@alphasmart.com.

Dana by AlphaSmart looks and operates like the AlphaSmart 3000 but has the added capabilities of being a Palm. UltraKey keyboarding software can be installed on the Dana to provide keyboarding instruction. Neo is another new version of AlphaSmart that has recently become available. To learn more about Neo, Dana and AlphaSmart solutions, call toll-free (888) 274-0680 or visit www.alphasmart.com

NETS for Students
Profiles for Technology Literate Students

Performance Indicators

A major component of the NETS Project is the development of a general set of profiles describing technology-literate students at key developmental points in their pre-college education. These profiles reflect the underlying assumption that all students should have the opportunity to develop technology skills that support learning, personal productivity, decision making, and daily life. These profiles and associated standards provide a framework for preparing students to be lifelong learners who make informed decisions about the role of technology in their lives.

The Profiles for Technology Literate Students provide performance indicators describing the technology competence students should exhibit upon completion of the following grade ranges:

- Grades PreK - 2
- Grades 3 - 5
- Grades 6 - 8
- Grades 9 - 12

These profiles are indicators of achievement at certain stages in PreK-12 education. They assume that technology skills are developed by coordinated activities that support learning throughout a student's education. These skills are to be introduced, reinforced, and finally mastered, and thus, integrated into an individual's personal learning and social framework. They represent essential, realistic, and attainable goals for lifelong learning and a productive citizenry. The standards and performance indicators are based on input and feedback from educational technology experts as well as parents, teachers, and curriculum experts. In addition, they reflect information collected from professional literature and local, state, and national documents.

Grades PreK-2

All students should have opportunities to demonstrate the following performances.
Prior to completion of Grade 2, students will:

1. Use input devices (e.g., mouse, keyboard, remote control) and output devices (e.g., monitor, printer) to successfully operate computers, VCRs, audiotapes, and other technologies. (1)

2. Use a variety of media and technology resources for directed and independent learning activities. (1, 3)

3. Communicate about technology using developmentally appropriate and accurate terminology. (1)

4. Use developmentally appropriate multimedia resources (e.g., interactive books, educational software, elementary multimedia encyclopedias) to support learning. (1)

5. Work cooperatively and collaboratively with peers, family members, and others when using technology in the classroom. (2)

6. Demonstrate positive social and ethical behaviors when using technology. (2)

7. Practice responsible use of technology systems and software. (2)

ISTE National Educational Technology Standards for Students

8. Create developmentally appropriate multimedia products with support from teachers, family members, or student partners. (3)

9. Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas, and stories. (3, 4, 5, 6)

10. Gather information and communicate with others using telecommunications, with support from teachers, family members, or student partners. (4)

Numbers in parentheses following each performance indicator refer to the standards category to which the performance is linked. The categories are:

1. Basic operations and concepts
2. Social, ethical, and human issues
3. Technology productivity tools
4. Technology communications tools
5. Technology research tools
6. Technology problem-solving and decision-making tools

Grades 3-5

All students should have opportunities to demonstrate the following performances.
Prior to completion of Grade 5, students will:

1. Use keyboards and other common input and output devices (including adaptive devices when necessary) efficiently and effectively. (1)

2. Discuss common uses of technology in daily life and the advantages and disadvantages those uses provide. (1, 2)

3. Discuss basic issues related to responsible use of technology and information and describe personal consequences of inappropriate use. (2)

4. Use general purpose productivity tools and peripherals to support personal productivity, remediate skill deficits, and facilitate learning throughout the curriculum. (3)

5. Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities to create knowledge products for audiences inside and outside the classroom. (3, 4)

6. Use telecommunications efficiently to access remote information, communicate with others in support of direct and independent learning, and pursue personal interests. (4)

7. Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities for the purpose of developing solutions or products for audiences inside and outside the classroom. (4, 5)

8. Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities. (5, 6)

9. Determine which technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems. (5, 6)

10. Evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources. (6)

Numbers in parentheses following each performance indicator refer to the standards category to which the performance is linked. The categories are:

1. Basic operations and concepts
2. Social, ethical, and human issues
3. Technology productivity tools
4. Technology communications tools
5. Technology research tools
6. Technology problem-solving and decision-making tools

GRADES 6-8

All students should have opportunities to demonstrate the following performances.
Prior to completion of Grade 8, students will:

1. Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use. (1)

2. Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society. (2)

3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse. (2)

4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research. (3, 5)

5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum. (3, 6)

6. Design, develop, publish, and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom. (4, 5, 6)

7. Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom. (4, 5)

8. Select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems. (5, 6)

9. Demonstrate an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving. (1, 6)

10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems. (2, 5, 6)

Numbers in parentheses following each performance indicator refer to the standards category to which the performance is linked. The categories are:

ISTE National Educational Technology Standards for Students

1. Basic operations and concepts
2. Social, ethical, and human issues
3. Technology productivity tools
4. Technology communications tools
5. Technology research tools
6. Technology problem-solving and decision-making tools

GRADES 9-12

All students should have opportunities to demonstrate the following performances.
Prior to completion of Grade 12, students will:

1. Identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these systems and services to address personal, lifelong learning, and workplace needs. (2)

2. Make informed choices among technology systems, resources, and services. (1, 2)

3. Analyze advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole. (2)

4. Demonstrate and advocate for legal and ethical behaviors among peers, family, and community regarding the use of technology and information. (2)

5. Use technology tools and resources for managing and communicating personal/professional information (e.g., finances, schedules, addresses, purchases, correspondence). (3, 4)

6. Evaluate technology-based options, including distance and distributed education, for lifelong learning. (5)

7. Routinely and efficiently use online information resources to meet needs for collaboration, research, publications, communications, and productivity. (4, 5, 6)

8. Select and apply technology tools for research, information analysis, problem-solving, and decision-making in content learning. (4, 5)

9. Investigate and apply expert systems, intelligent agents, and simulations in real-world situations. (3, 5, 6)

10. Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce, and disseminate information, models, and other creative works. (4, 5, 6)

Numbers in parentheses following each performance indicator refer to the standards category to which the performance is linked. The categories are:

1. Basic operations and concepts
2. Social, ethical, and human issues
3. Technology productivity tools
4. Technology communications tools
5. Technology research tools
6. Technology problem-solving and decision-making tools